



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 10/802,803  
Filing Date: March 18, 2004  
Applicant(s): Lars Jørn Stenberg, et al.  
Group Art Unit: 2615  
Examiner: Huyen D. LE  
Title: MINIATURE MICROPHONE WITH BALANCED TERMINATION  
Attorney Docket: 45900-000791/US

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Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
**Mail Stop AF**

January 23, 2008

**DECLARATION UNDER 37 C.F.R. § 1.131**

Madam:

We, Lars Jørn Stenberg, Matthias Mullenborn, and Igor Mucha, hereby declare and state:

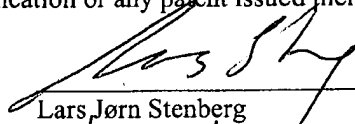
1. We are the joint inventors of the claimed subject matter of the above-identified patent application.
2. The application is currently assigned to Sonion A/S, as recorded on June 18, 2004 at REEL/ FRAME: 015476/0473.
3. Prior to February 18, 2003, we conceived a microphone, as disclosed and claimed in the present U.S. application.

4. Prior to February 18, 2003, we disclosed our invention in writing to others within Sonion for purposes of preparing a patent application. A copy of the invention disclosure (with dates blocked out) is attached as **Exhibit A**.


5. On March 18, 2003, U.S. Provisional Application No. 60/455,438 was filed with the U.S. Patent and Trademark Office.

6. On March 18, 2004 the present U.S. application, U.S. Serial No. 10/802,803, was filed with the United States Patent and Trademark Office.

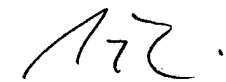
7. We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
Lars Jørn Stenberg

Dec. 20<sup>th</sup>, 2007  
Date

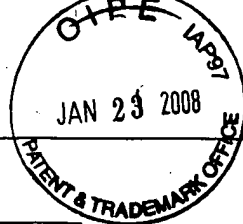
  
Matthias Mullenborn

Dec. 21, 2007  
Date

  
Igor Mucha

December 14<sup>th</sup>, 2007  
Date

Attachment: Exhibit A



## Idea Registration Form

(To be filled in by IP Manager SonionMicrotronic)

Idea-number :

*Name inventor 1* : Igor Mucha, Matthias Müllenborn  
*Name inventor 2* : Lars J. Stenberg  
*Idea conceived at least as early as* :  
*Name of the idea* : Silicon microphones with balanced input and/or  
 output for improved resistance to EMI and supply noise  
*Reduced to practice at least as early as* : -

mark with "X" for Yes

*Source:*

- Within Sonion:
  - Sonion A/S ☐
  - SonionKirk ☐ (Choose)
  - SonionMEMS ☒
  - SonionMicrotronic ☐ (Choose)
  - SonionTech ☒
- Meeting with other parties ☐

Other Party:

Address:

**Description of the idea****Current situation/practice**

Today's amplifying electronics integrated in miniature (electret) condenser microphones for hearing instruments, mobile phones, toys and similar consumer applications exhibit unbalanced input and output. This choice matches well the market dominance of unbalanced type of condenser microphone cartridges and furthermore the need for having minimum number of microphone terminals for keeping assembly costs down as today's conventional condenser microphones typically uses soldered wires or spring contacts for electrical connection to the system.

**Idea**

Of the characteristic intrinsic advantages of silicon condenser microphones, their high temperature resistance & stability which makes them surface mountable (no wires and/or bulky contacts!) and the feasibility of manufacturing balanced microphone cartridges, makes it feasible and highly technically desirable to equip them with amplifying electronics featuring balanced input and output. Even for low cost unbalanced silicon microphones, unbalanced input - balanced output is technically desirable. The advantages of using balanced output and/or balanced input, are primarily less EMI sensitivity and better power supply (noise) rejection characteristics. Furthermore, coupling capacitors to the external system may in some cases be omitted, reducing cost of use.

**Novelty**

Balanced (differential) or unbalanced condenser microphones are 'prior art', as well as balanced (differential) output and/or input amplifying electronics for larger size microphones of high quality (professional studio microphones, measurement microphones etc.).

The novelty in the above idea is assumed to be in using these balanced amplifier principles integrated in silicon microphones. In this class of surface mountable condenser microphones, the few extra microphone terminals do not add to assembly costs and time, making it economically feasible and technically attractive to use balanced out/(in) electronics in the microphone.

**Advantages**

Lower EMI sensitivity, better rejection of power supply noise and other electrical interferences at the balanced terminals. For the ever lowering power supply, balanced outputs (inputs) also mean doubling of the overload margin. Doubling of the microphone sensitivity is as an alternative also possible

**Variations****Markets**

- hearing aids ☒
- telecommunications ☒
- headsets ☒
- smart hand-held devices ☐
- other ☐ , namely:

**Prior art**

See above.

**Additional remarks**

See different embodiments of the idea below.

